

## VENUSIAN SURFACE ROUGHNESS INVERSION USING TWO SCALE APPROXIMATION

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Magellan was launched on May 4, 1989 on the Shuttle Atlantis in order to achieve global imaging of the Venus surface [R. S. Saunders et al., J. Geophys. Res., vol. 95, pp. 8339-8355, 1990]. Since the Venusian surface is covered by a dense and optically opaque cloud layer, radar mapping is the best tool to obtain surface morphology and electrical properties. The Magellan radar operates in three different modes: altimeter, SAR, and radiometer. Using the altimeter data, the near nadir backscattering cross sections can be obtained. The SAR backscattering data provide the diffuse scattering cross section by small scale surface features. From the radiometer data, the emissivity of the Venus surface can be estimated.

In this paper, we present an algorithm which systematically estimates Venus' surface parameters using the two scale approximation. These surface parameters are the large scale spectral slope, dielectric constant, small scale surface rms height, and the small scale spectral slope, assuming that the surface power spectrum is a power-law spectrum. Our approach uses all three Magellan data sets (altimeter, SAR, and radiometer) and the resultant two scale predictions satisfy all the data sets simultaneously within the measurement error. As a test of our algorithm, we performed the surface parameter estimation using the Magellan data near Gula Mons. The estimated values are very close to the surface characteristics of the Playa lava flows on Earth. This and other examples will provide the effectiveness of the algorithm and the surface characteristics of some Venusian surfaces.